

90148



901480



NEW ZEALAND QUALIFICATIONS AUTHORITY  
MANA TOHU MĀTAURANGA O AOTEAROA



For Supervisor's use only

# Level 1 Mathematics, 2008

## 90148 Sketch and interpret graphs

Credits: Three  
9.30 am Monday 24 November 2008

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should answer ALL the questions in this booklet.

You should show ALL working.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–13 in the correct order and that none of these pages is blank.

**YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.**

For Assessor's use only		Achievement Criteria	
Achievement		Achievement with Merit	Achievement with Excellence
Sketch, and interpret features of, graphs.	<input type="checkbox"/>	Sketch, and interpret features of, graphs.	<input type="checkbox"/>
		Write equations for linear graphs.	<input type="checkbox"/>
Overall Level of Performance (all criteria within a column are met)			<input type="checkbox"/>

You are advised to spend 25 minutes answering the questions in this booklet.

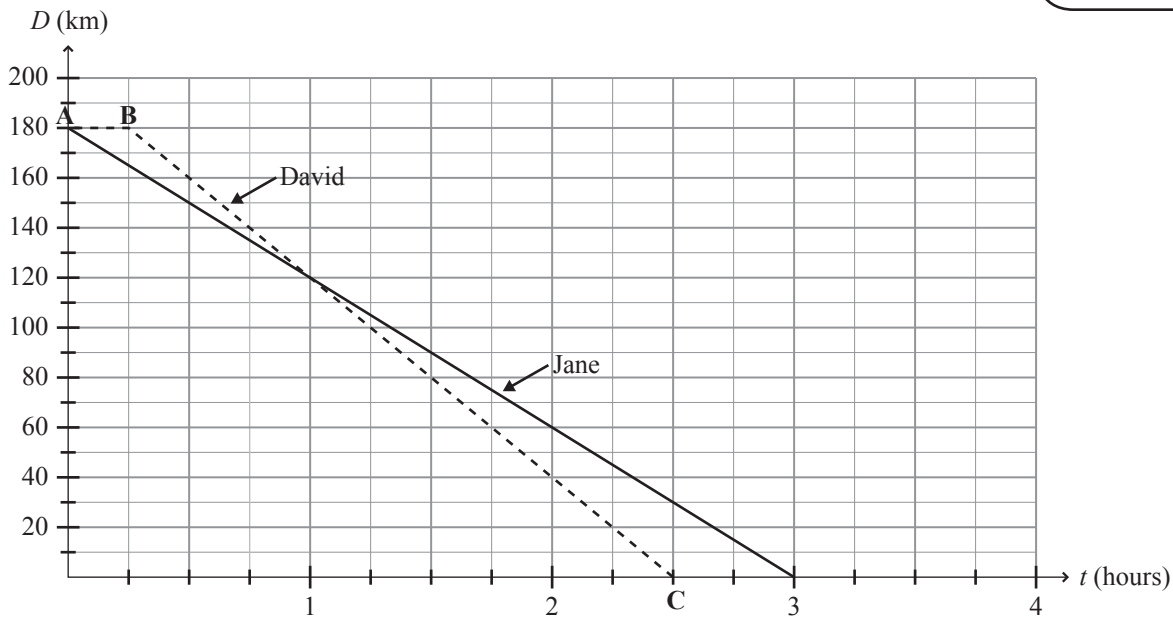
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## QUESTION ONE

David and Jane travel separately from Asheridge to Hedgerow.  
Hedgerow is 180 km from Asheridge.

The graph shows their distances from Hedgerow in kilometres,  $D$ , and the time,  $t$ , in hours.

*If you need  
to redraw this  
graph, use the  
grid on page 9.*



- (a) What is Jane's average speed?

\_\_\_\_\_

Average speed = \_\_\_\_\_ kilometres per hour

- (b) After Jane has been travelling for two hours, who is the closer to Hedgerow and how much closer are they?

\_\_\_\_\_

\_\_\_\_\_ by \_\_\_\_\_ kilometres

- (c) Describe David's journey in relation to Jane's.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- (d) Emma cycles from Pompalona to Hedgerow.  
The equation for her distance,  $D$ , from Hedgerow is given by:

$$D = 100 - 40t$$

where  $t$  is the time in hours.

Draw a line on the graph on page 2 to show Emma's distance from Hedgerow.

- (e) David's journey is shown on the graph on page 2. The journey is made up of two parts.  
Give the equation of each of the two parts.

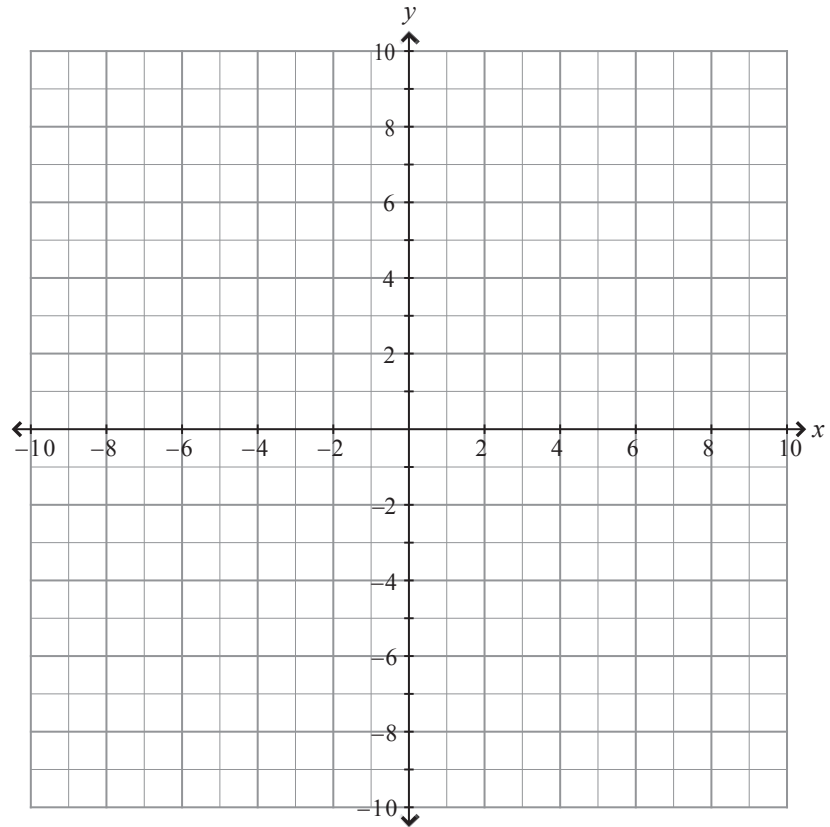
AB \_\_\_\_\_

BC \_\_\_\_\_

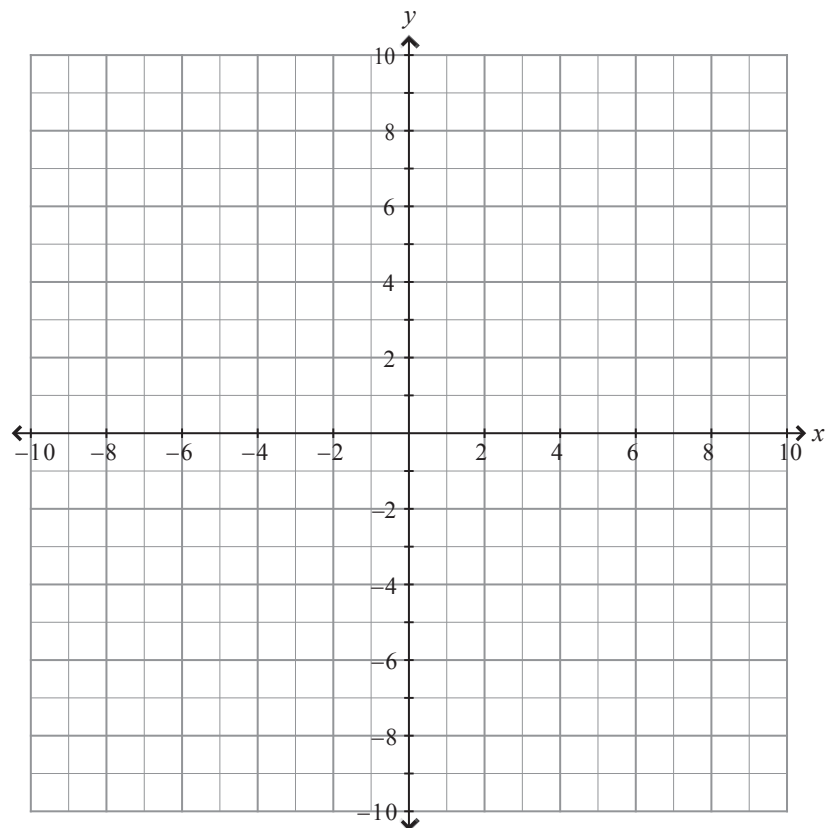
**QUESTION TWO**

Use the grids alongside to draw graphs of:

(a)  $y = 2x + 1$



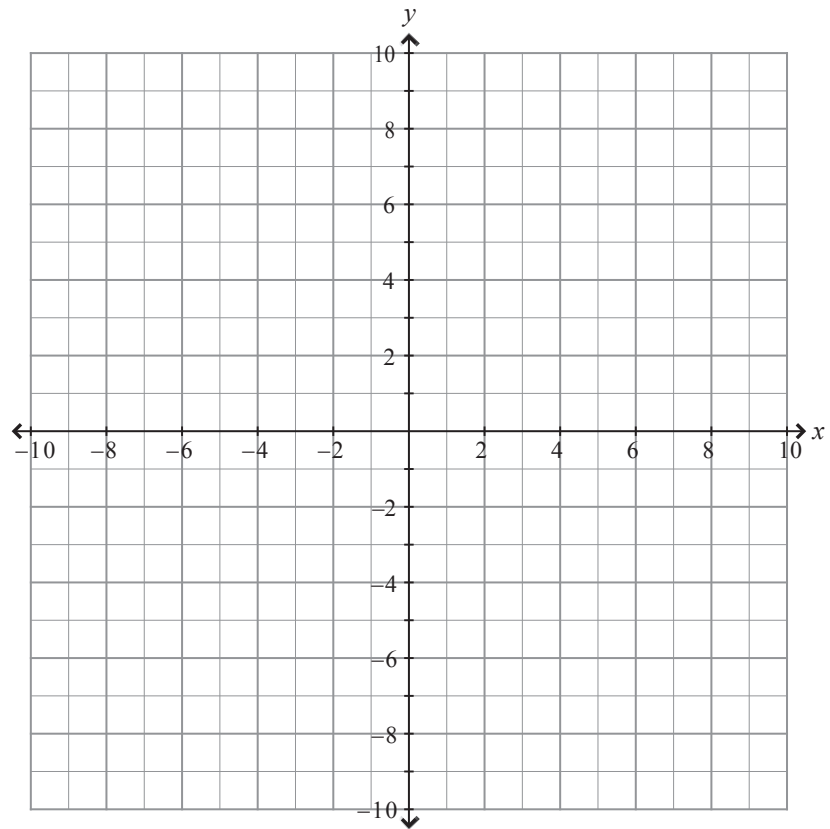
(b)  $y = x^2 - 9$



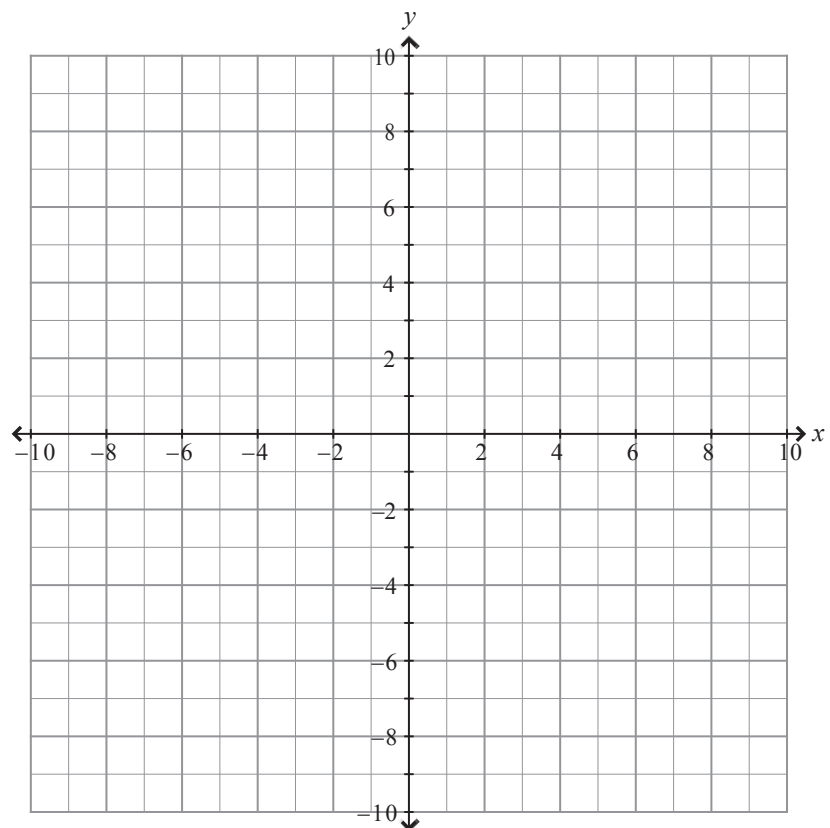
*If you need to redraw either of these graphs, use the grids on page 10.*

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(c)  $5y - 4x = 20$



(d)  $y = x(4 - x)$

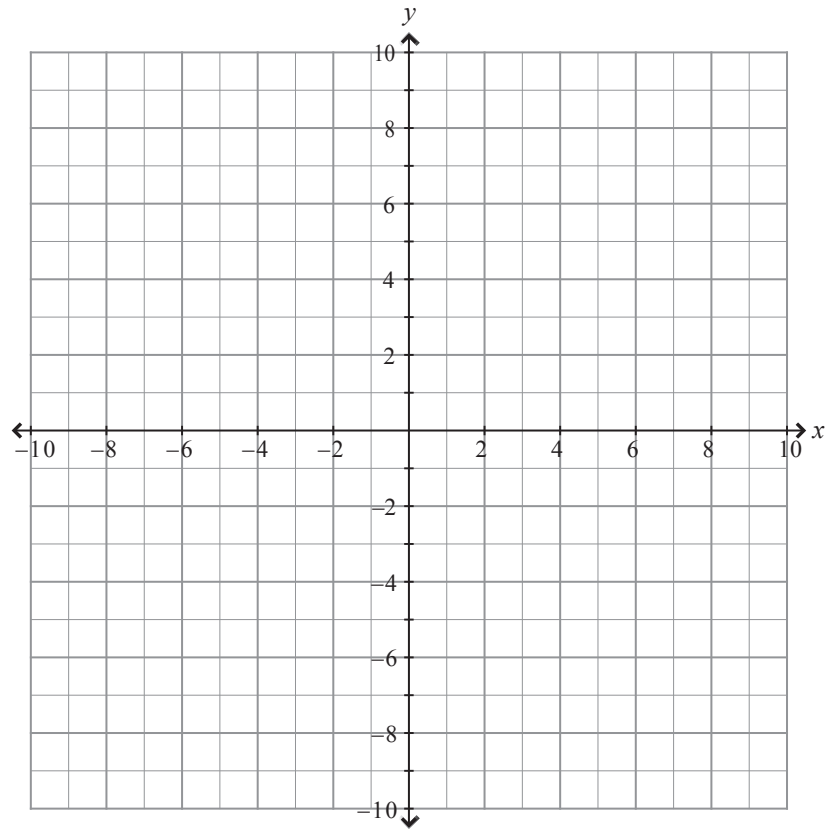


*If you need  
to redraw either  
of these graphs,  
use the grids on  
page 11.*

(e)  $y = (x - 5)(x + 1)$

$$= x^2 - 4x - 5$$

$$= (x - 2)^2 - 9$$

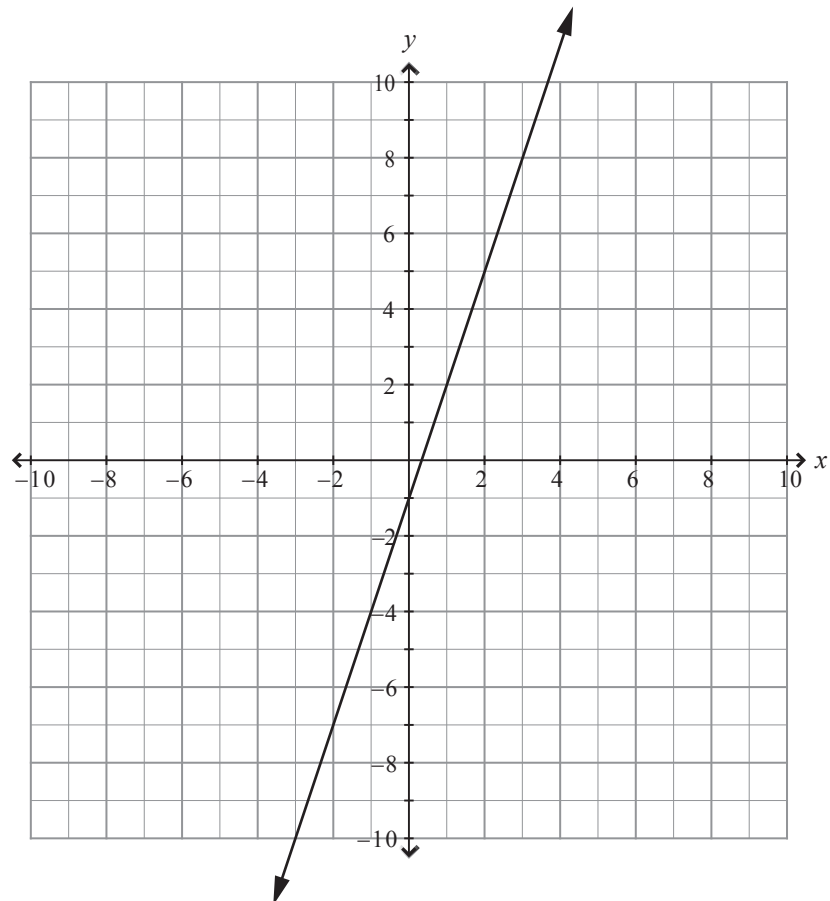


*If you need  
to redraw the  
above graph,  
use the grid on  
page 12.*

### QUESTION THREE

Write the equation of the line  
drawn on the grid:

\_\_\_\_\_



**QUESTION FOUR**

Bio-fuel made from corn is currently produced for \$4.50 per litre.

Researchers expect production costs to keep increasing while the fuel is still being developed.

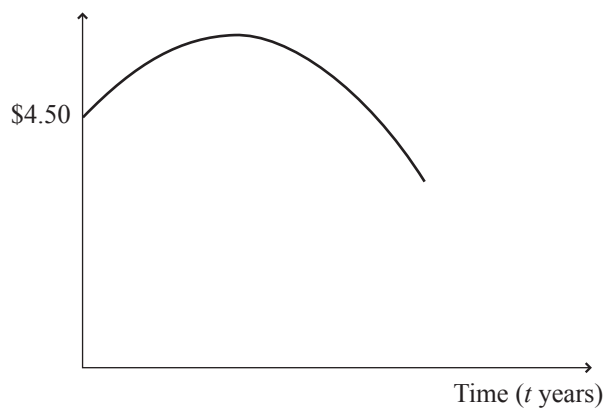
They predict that, as technology improves, the cost increases will slow down and then decrease until the cost reaches \$3 per litre.

Their model for the production cost of one litre of bio-fuel from corn over the next seven years, has

the formula  $C = \frac{-1}{6}(t - 3)^2 + 6$

where  $C$  is the production cost per litre in dollars and  $t$  is the time from now, in years.

Production cost per litre (\$C)



- (a) With this model, how many years is it until the production costs start decreasing?

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Number of years is: \_\_\_\_\_

- (b) What is the maximum production cost per litre predicted by this model?

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Maximum cost is \$ \_\_\_\_\_

- (c) How long does this model suggest it will take for production costs to return to \$4.50 per litre?

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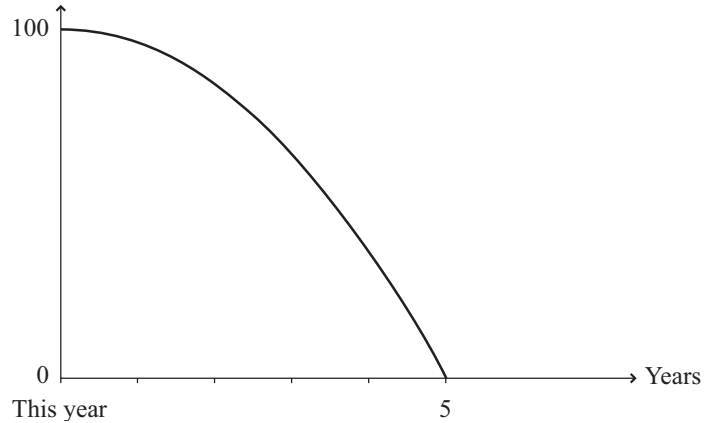
\_\_\_\_\_ years

## QUESTION FIVE

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The percentage of Eco Cab taxis that **do not** run on bio-fuel will decrease every year. This year there are no Eco Cab taxis running on bio-fuel. It is predicted that in five years' time, all Eco Cab taxis will be running on bio-fuel.

Percentage of Eco Cab taxis **not** running on biofuel



Write the equation for the **parabola** that matches the shape of the graph above and models this situation.

Use your equation to find how long it will be before 50% of the Eco Cab taxis will be running on bio-fuel.

You must show the equation you use to find the solution to this problem.

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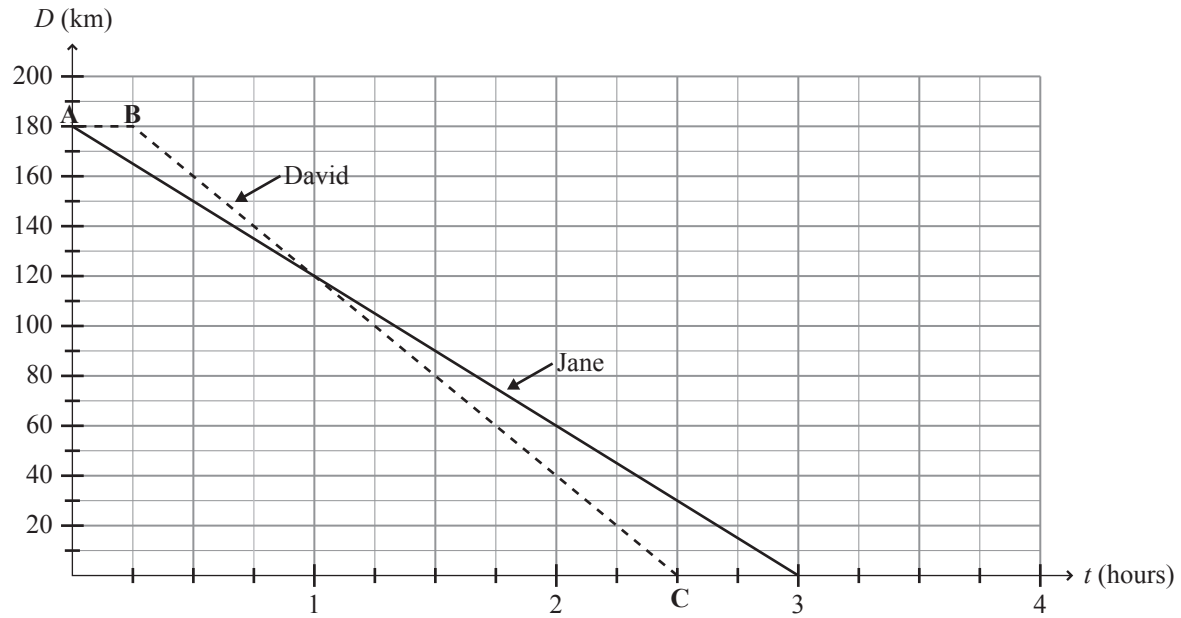
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Number of years = \_\_\_\_\_

**SPARE GRAPHS**

If you need to redraw the graph for question 1(d), draw it on the grid below.

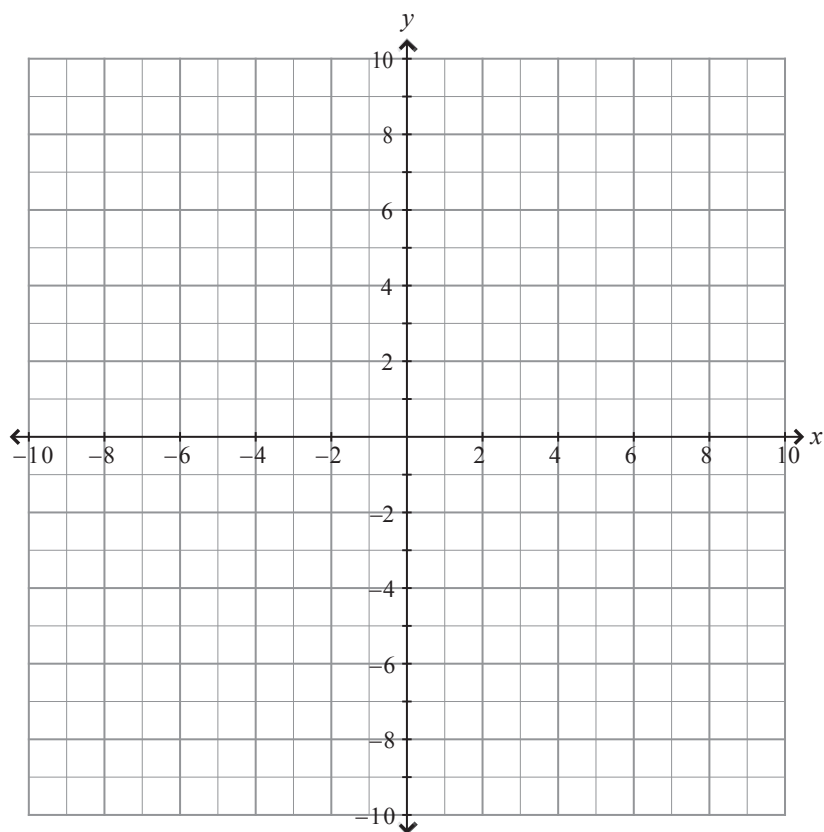
Question 1(d)



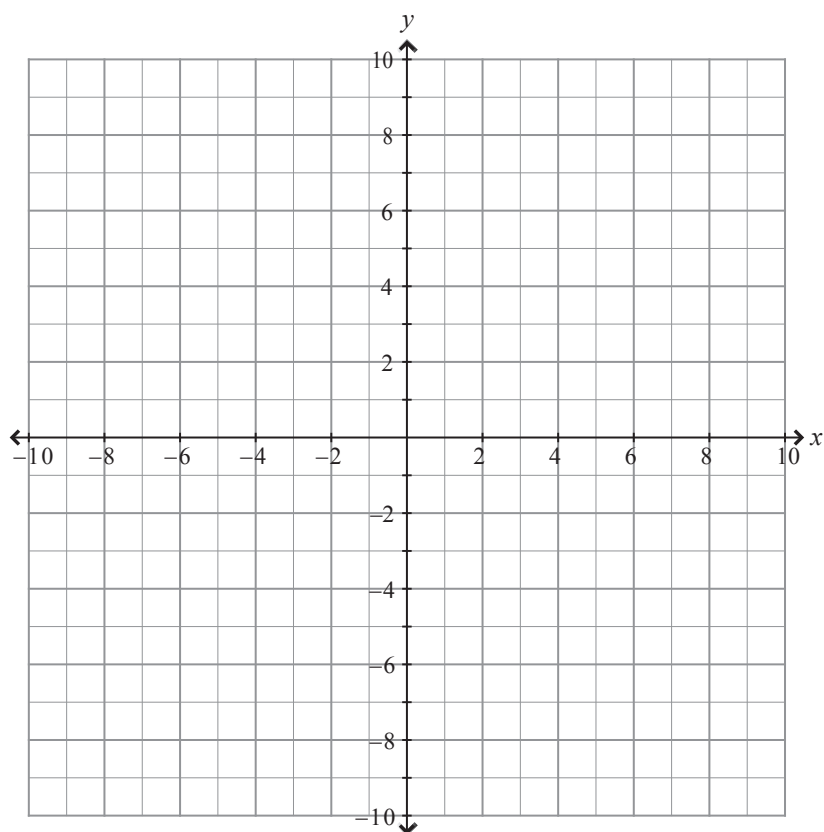
If you need to redraw a graph from page 4, draw it on a grid below and carefully number the question. Make sure it is clear which graph from each question you want marked.

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Question \_\_\_\_\_



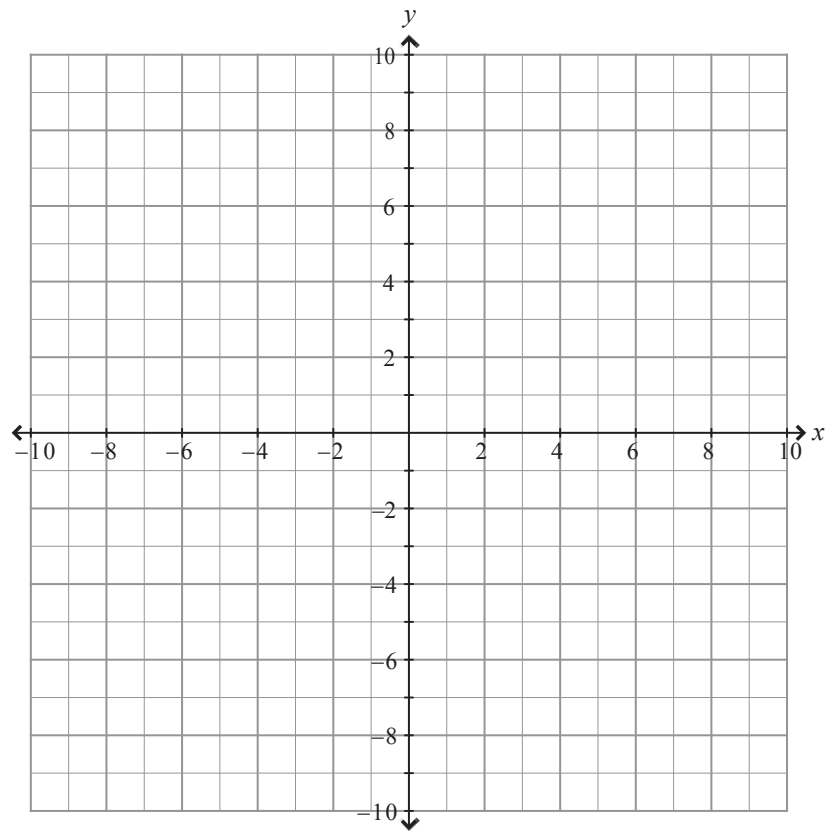
Question \_\_\_\_\_



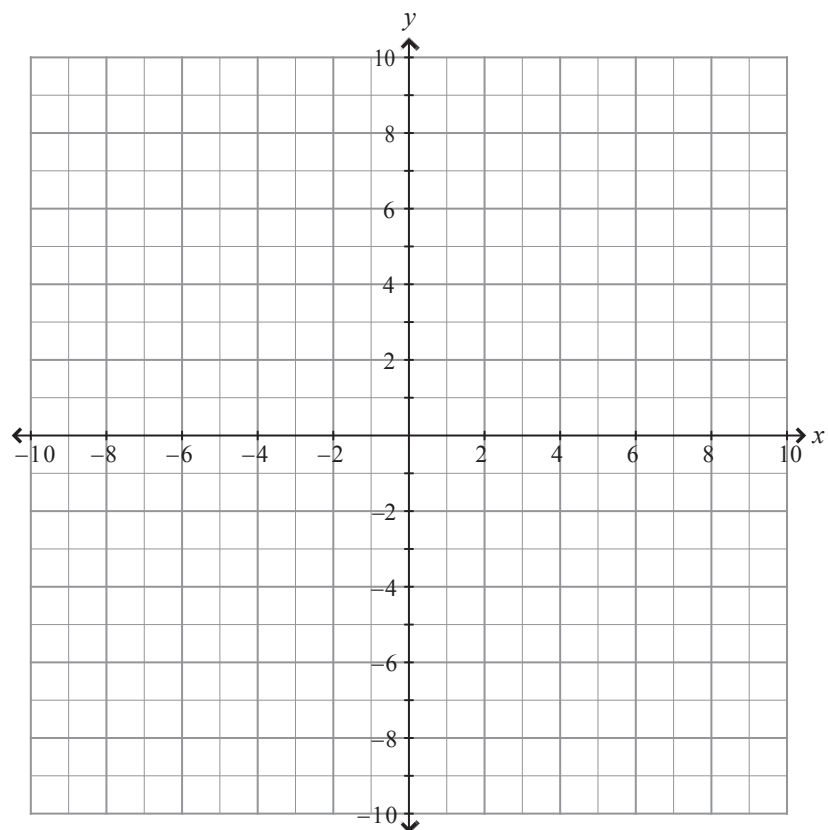
If you need to redraw a graph from page 5, draw it on a grid below and carefully number the question. Make sure it is clear which graph from each question you want marked.

Assessor's  
use only

Question \_\_\_\_\_



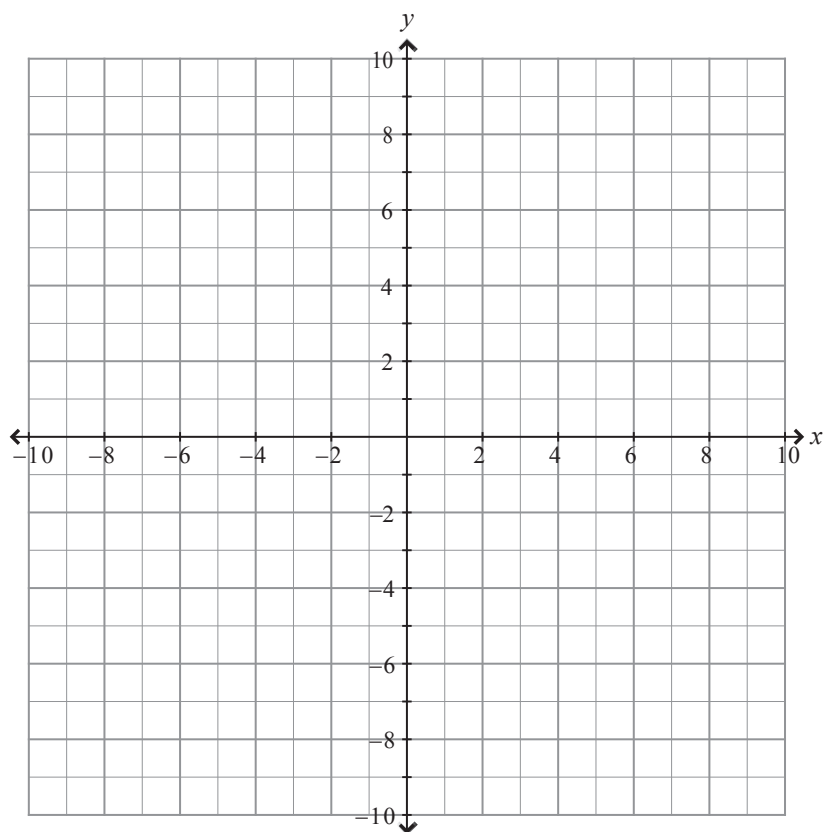
Question \_\_\_\_\_



If you need to redraw the graph from page 6, draw it on the grid below and carefully number the question. Make sure it is clear which graph from the question you want marked.

Assessor's  
use only

Question \_\_\_\_\_



**Extra paper for continuation of answers if required.  
Clearly number the question.**

Assessor's  
use only

Question  
number